

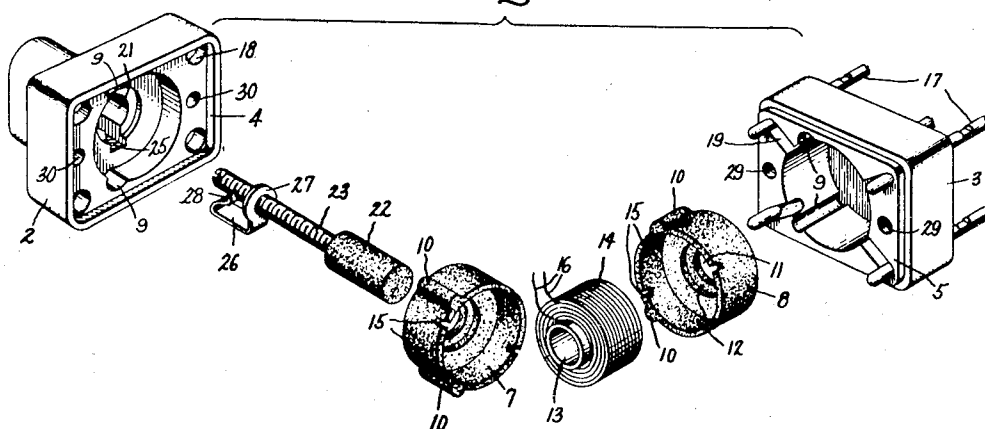
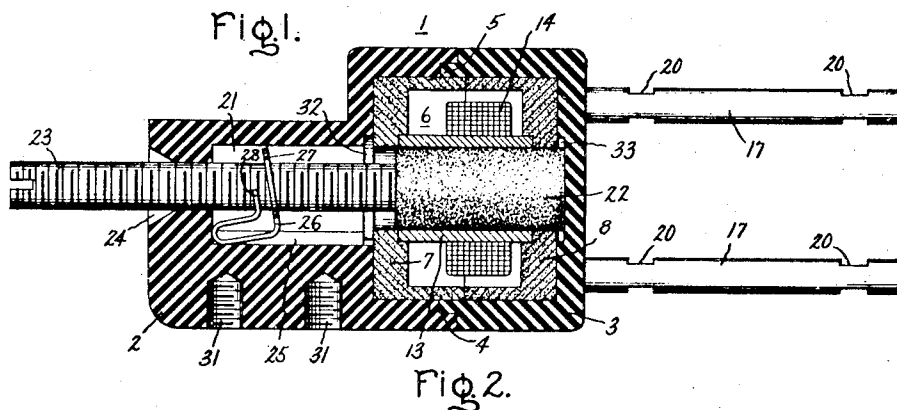
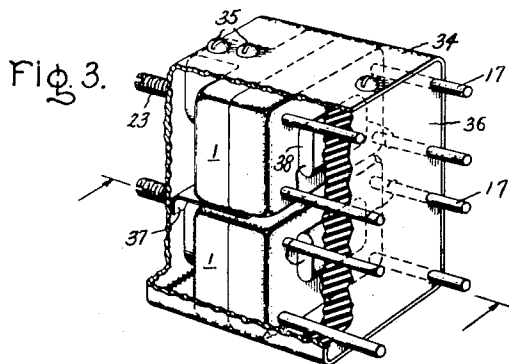
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E. O. PETERSON ET AL

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INDUCTANCE UNIT

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Inventors:
Eric O. Peterson,
David I. Wright,
Henry T. Heaton,
by *Harry E. Dunham*
Their Attorney.

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INDUCTANCE UNIT

Eric O. Peterson, Bridgeport, David I. Wright,
Westport, and Henry T. Heaton, Milford, Conn.,
assignors to General Electric Company, a cor-
poration of New York

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1

Our invention relates to radio apparatus and it has for its object to provide a new and improved radio frequency inductance unit.

It is another object of our invention to provide a new and improved radio frequency transformer.

One of the features of our invention is the provision of a molded body of insulating material constituted by separable portions which, when united, form a substantially closed chamber in which the magnetic core and winding of an inductance unit may be supported. Terminals molded in the insulating material provide a conducting path between the ends of the inductance coil and external connections to the coil, as well as means for mounting other components of the radio apparatus. When two such inductance units are mounted within a metallic member, the coils of the units are shielded from fields external of the metallic member and are coupled by the metallic member which functions as a link coupling.

It is still another object of our invention to provide a new and improved unitary high frequency inductance unit which is relatively simple to manufacture and assemble and may be constructed at relatively low cost.

The features of our invention which we believe to be novel are set forth with particularity in the appended claims. Our invention itself, however, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawing in which Fig. 1 is a sectional view of one of the inductance units used in our transformer arrangement; Fig. 2 is an exploded view of the inductance unit of Fig. 1; and Fig. 3 is a view, partly in section, of a radio frequency transformer constructed according to our invention.

Referring to Figs. 1 and 2 jointly, there is shown a sectional view of a unitary inductance member 1 which comprises a molded body of a suitable insulating material, for example, a synthetic resin, and which is formed as two separable parts 2, 3 adapted to fit together in interlocking engagement, the member 2 being provided with a flange 4 which surrounds a raised portion 5 in the molded part 3. When interfitted, the members 2, 3 form a substantially closed chamber 6 in which is disposed a magnetic core, the magnetic core comprising two identical cup-like members 7, 8. The chamber 6 is substantially cylindrical in form and each of the molded members 2, 3 is provided with a pair of longi-

2

tudinal slots 9 into which fit a pair of projections 10 on the magnetic cups 7, 8. The magnetic core comprising the cups 7, 8 preferably is formed of a molded or compressed composition comprising powdered iron particles and the projections 10, by fitting into the slots 9, prevent movement of the core body within the chamber 6. Each of the cups 7, 8 is likewise provided with a centrally located aperture 11 and a recessed portion 12 surrounding the aperture 11 in which is adapted to be fitted a tubular form 13 of a suitable dielectric material and upon which is wound an inductance coil or winding 14. The magnetic cups 7, 8 are likewise provided with four symmetrically placed notches 15 through which pass the leads 16 of the coil 14.

The body member 3 has molded therein four conductive rods or terminal members 17. One end of each of the rods 17 is adapted to fit into a corresponding one of a plurality of holes 18 provided in the molded member 2. The member 3 likewise has a plurality of slots 19 extending from the left-hand end of each of the terminals 17 to the central opening within the member 3, these slots being provided to accommodate the lead 16 of the inductance coil. Each of the terminals 17, moreover, is provided throughout its length with a plurality of notches 20 by means of which the wrapping of a wire around the conductor 17 and its soldering thereto are expedited. Moreover, the holes 18 in the body member 2 are substantially larger than the circumference of the terminals 17 so that the ends of these terminals, even when the leads 16 are wrapped thereabout and soldered thereto, fit into the holes 18 without injury to the leads.

The molded member 2 likewise is provided with a longitudinal aperture or passageway 21 which extends from the chamber 6 to the left-hand end of the member 2 and has a diameter slightly larger than the diameter of a magnetic tuning member or slug 22, which is adapted to pass through both the hole 11 in the magnetic core member 7 and the coil form 13. Formed integrally with the tuning slug 22 is a metallic shaft portion which comprises the screw or threaded member 23, which extends through an aperture 24 at the end of passageway 21 in molded member 2. In order to maintain the tuning slug 22 in an adjusted position, the body member 2 is provided with a rectangular aperture or slot 25 lying below and connected to the longitudinal passageway 21, and a resilient metallic member 26 is adapted to fit in the slot 25. The member 26 at one end has an arm 27 in which is an aper-

3

ture of substantially the same diameter as screw 23 and which is adapted to slide over the screw 23. At its other end, the member 26 is U-shaped and has a yoke 28 which likewise engages the screw 23. The hole in the arm 27 is eccentric with the yoke 28 so that the yoke 28 presses against the screw 23 and tends to rotate the member 26 on the screw 23, the member 26 pivoting about the hole in the arm 27. As a result of this structure, when the member 26 is placed within the slot 25, it presses against the bottom wall of the slot and the yoke 28 presses against the screw 23. The member 26 thus engages the threads on screw 23 and tends to resist longitudinal movement of the screw 23 in the aperture 21, maintaining the tuning slug in an adjusted position.

The molded member 3 is also provided with a plurality of tapped holes 29 and the member 2 is provided with corresponding holes 30 so that the molded body may be held together by means of screws to form a unitary inductance member which is easily adapted to incorporation into a radio chassis. To this end, the member 2 is provided with a plurality of tapped holes 31 by means of which the unitary inductance member may be supported.

In certain uses, it may be desirable to form an inductance unit which does not include the magnetic core members or cups 7, 8. To this end, the members 2 and 3 are provided, respectively, with the aligned recesses 32, 33 having a diameter substantially equal to the diameter of the coil form 13. In such installations, a coil form having a length greater than that shown in Figs. 1 and 2 is employed and the ends of the coil form fit in the recesses 32, 33.

The composite inductance unit described above is especially well adapted for use in the formation of transformers for high frequency currents. Fig. 3 illustrates such an application in which a pair of the coil assemblies are placed within a conductive member or shield 34 and the coil assemblies 1 are secured to the member 34 by means of a plurality of screws 35 which engage the threads of holes 31. The metallic shield 34 is likewise provided with a pair of apertures, not shown, through which project the ends of the tuning slug adjusting screws 23. The bottom end of the shielded member 34 is closed by means of a wall 36 of insulating material through which project the ends of the terminals 17. In this construction, the member 34 functions both to shield the windings within the coil assemblies 1 from electromagnetic fields external to the member 34 and also to couple the windings within the coil assemblies. The degree of coupling may be adjusted by means of a transverse wall or separating shield 37 lying between adjacent coil assemblies 1. The shield 37 is of a height and of the necessary conductivity to provide a required degree of coupling between the coil assemblies. Such a transformer is especially well adapted for use in the intermediate frequency circuits of radio receivers, and in such installations the individual windings may be resonated by means of capacitances 38 connected between the terminals 17 and shunting the windings within the coil assemblies 1. The individual units may be tuned to a desired frequency by movement of the screws 23 to adjust the tuning slugs within the coil windings.

The shield can 34 may be of any suitable non-

4

magnetic metal, such as aluminum. The separating shield 37 likewise may be formed of aluminum or may be formed of a dielectric material, such as a molded synthetic resin, which is coated with a suitable conductive material, such as, for example, silver. In the transformer arrangement, the windings 14 within the coil assemblies 1 are arranged with parallel axes and the shield member 34 functions as a one-turn link coupling between these windings. The separating shield 37 functions as a short-circuit over a portion of this turn and its height and conductivity control the degree of coupling.

It is thus seen that our invention provides a sturdy and compact coil assembly which is especially well adapted for use in radio frequency circuits. The units may be used singly as inductance units, filters or wave traps, or as a portion of a resonant means in oscillator circuits. They may be employed in pairs, together with a link coupling means, for radio frequency and intermediate frequency transformer arrangements, each unit being composed of a minimum number of easily formed parts. Their construction minimizes assembly and tuning operations.

While we have shown a particular embodiment of our invention, it will of course be understood that we do not wish to be limited thereto since various modifications may be made, and we contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of our invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. A transformer arrangement for high frequency currents comprising a plurality of housing members, each of said members comprising insulating means forming a substantially closed chamber, a magnetic core supported within said chamber, a winding disposed within said core, and a one-turn link coupling for said windings within said chambers comprising a conductive body surrounding said members for shielding said windings from electromagnetic fields external to said body.

2. A transformer arrangement for high frequency currents comprising a plurality of housing members, each of said members comprising insulating means forming a substantially closed chamber, a magnetic core supported within said chamber, a winding disposed within said core, a conductive body surrounding said members for shielding said windings from electromagnetic fields external to said body and for coupling said windings within said chambers, and a conductive shield member disposed between said housing members for controlling the amount of said coupling.

ERIC O. PETERSON.
DAVID I. WRIGHT.
HENRY T. HEATON.

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